Boost Venturi Probes

Boost Venturi Probes are used to amplify the measured velocity pressure in a flowing fluid. The measured total pressure is unchanged from a Pitot-Static reading but the flow is accelerated in the venturi passages, as in a flow nozzle, so the static pressure reading is lower than that obtained with a Pitot-Static probe.

The magnitude of the boost or gain is defined as: $\frac{PT2 - PS2}{PT1 - PS1}$ where PT2, PS2 are total and static pressure measured by the probe and PT1, PS1 are free stream values as measured by a conventional Pitot-Static probe. The standard Boost Venturi probes (Types A and B) provide approximate gain figures of 10 and 4.

By amplifying the velocity pressure difference (PT - PS) with a Boost Venturi, a more accurate measurement can be made of this difference. This increase in accuracy will be achieved, however, only if the probe's gain is accurately known, and this may require that the probe be calibrated under actual flow conditions.

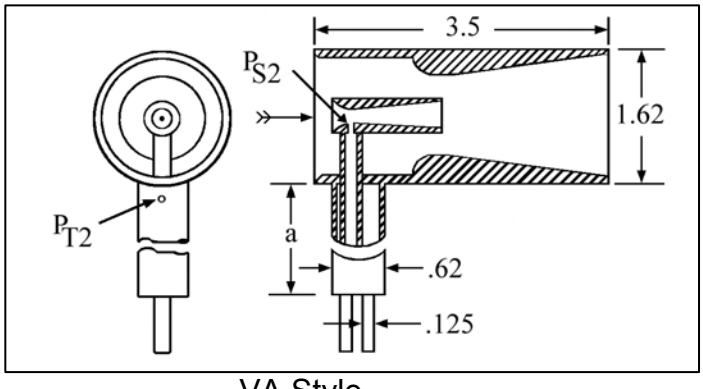
When used for monitoring a fixed flow, a Boost Venturi gives a lower permanent pressure drop than an orifice. These probes may also be used with a differential pressure controller to perform flow control and / or limit functions.

TYPE VA
Large outer venturi encompassing smaller inside venturi for maximum gain of 9 plus.

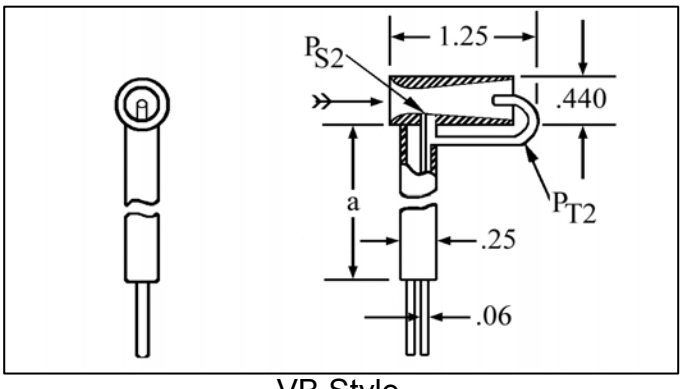
TYPE VB and VBT
Smaller more compact venturi for maximum gain of 3 plus.

Ordering Part Number	Amplified Reading (Gain)	Probe Length a	Operating Temperature	Construction
VA-4-12 VA-10-12	4 9 plus	12"	900°F	Stainless Steel
VB-4-12	3 plus		2000°F Welded optional	
VBT-4-12	3 plus		900°F	

Dimensions:



VA Style



VB Style

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Factors in Boost Venturi Calibration

Boost Venturi probes can be used with either liquids or gasses. With liquids the gain ration is more constant as it depends only on Reynolds Numbers (Nr = VpD/u = velocity x density x diameter / viscosity). With gases, it depends on both Reynolds Number and Mach Number (NM = V/a = velocity / speed of sound).

The effect of friction causes the gain to become smaller as the Reynolds Number becomes smaller, similar to the drop in flow coefficient of nozzles at Reynolds Numbers.

The effects of compressibility cause the gain to become smaller as the Mach Number becomes larger. This can be seen by noting that with increasing velocity and M1 approaching the probe, PT1-PS1 would increase, but PT2-PS2 at the throat would approach a limit as choking was approached.

With probes designed for high gain, i.e. a large increase in velocity at the throat, greater compressibility effects are observed at lower approach velocities than with probes designed for less gain. Typical variations are shown in Fig. 1.

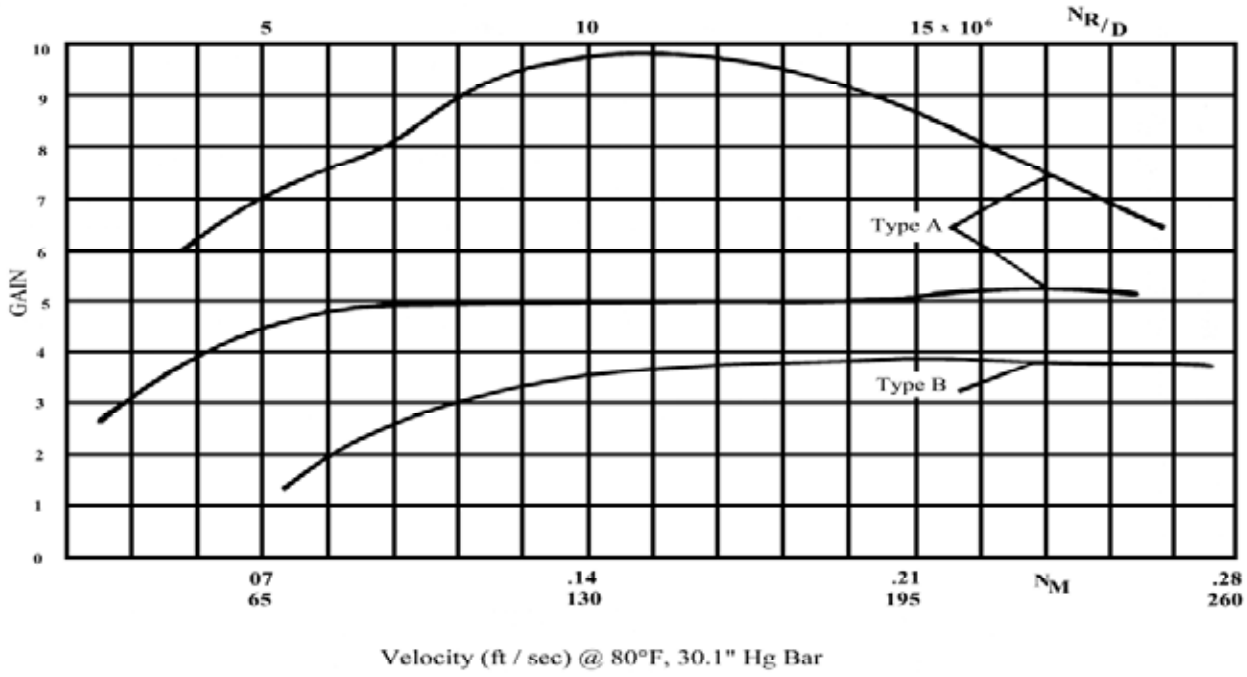

Figure 1. Typical Calibrations in Gas for Types VA and VB Boost Venturi

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